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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
10/029,193	12/20/2001	Frank S. Geefay	10010872-1 5393	
75			EXAM	INER
AGILENT TECHNOLOGIES, INC.			LEE, HSIEN MING	
Legal Departme	nt, DL429			· · · · · · · · · · · · · · · · · · ·
Intellectual Prop	perty Administration	*	ART UNIT	PAPER NUMBER
P.O. Box 7599	•		2823	
Loveland, CO	80537-0599			
			DATE MAILED: 05/24/2004	4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary Examiner Histon-Ming Lee 2823 Period for Repty A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM. THE MAILING DATE OF THIS COMMUNICATION. Extension for them may be enables used the specifical add of SFR 1.135(a). In sevent, however, may a nepty be timely filed if the period for may be a realised used the specifical add of SFR 1.135(a). In sevent, however, may a nepty be timely filed if the period for may be a realised used the specifical add of SFR 1.135(a). In sevent, however, may a nepty be timely filed if the period for may be a realised used to the sevent and a SFR 1.135(a). In sevent, however, may a nepty be timely filed if the period for may be a realised used to the sevent and sevent and the statutory information of the priod for the sevent of the s		Application No.	Applicant(s)				
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A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION. Extensions of time may be waited width the provisions of 37 CFR 1.138(a). In no event, however, may a reply to simily filled after SK (6) MONTH'S from the making date of this communication. If the patient or reply specified since it less than this (30) days, a reply within the statutory minimum of thiny (30) days will be considered timely. Failure to reply within the set or catended period for reply with price will apply and will apply apply and in apply apply and the statutory minimum of thiny (30) days will be considered timely filled, may reduce unity apply and in apply and will apply and will apply and will apply apply and in apply and will apply and will apply apply and in apply and will apply ap		. •	2823				
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DETAILED ACTION

Grounds of Rejection

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
- 2. Claim 12 is rejected under 35 U.S.C. 102(e) as being anticipated by Morizumi et al.(US 6,485,814).

Morizumi et al., in Figs.4-5 and related text, teach the claimed semiconductor device, comprising:

- a wafer 6 of resistive semiconductor material (i.e. ceramic, col. 3, line 59) having a through-hole 10, a front side (i.e. top side), and a back side (i.e. bottom side), the through-hole 10 having inner walls, wherein the width of the through-hole 10 increases from a minimum width on one side (i.e. top side) to a maximum width on the other side (i.e. bottom side);
- a front contact 8 on the front side of the wafer 6;
- a back contact 13 (i.e. a portion of 13 that adheres on the bottom side of the wafer 6) on the back side of the wafer 6; and
- a metal layer 13 (i.e. Au-plated pad) adheres to the inner walls of the through-hole 10 and connects the front contact 8 to the back contact 13.

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Claim Rejections - 35 USC § 103

- The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
- 4. Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morizumi et al in view of Thomas (US 6,326,689).

In re claims 13 and 14, Morizumi et al do not expressly teach that the through-hole 10 is less than 80 microns (claim 13) and 50 microns (claim 14) at its widest.

However, the selection of the widest width of the through-hole is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). For example, the selection of the widest width of the through-hole involves a thickness of the wafer and a required width of the contact area for conductive lines formed on the inner walls of the through-hole, as evidenced by Thomas (col. 5, lines 25-30 and 52-59).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to optimize the widest width of the through-hole in Morizumi et al with the considerations of wafer thickness and desired contact area, as taught by Thomas, since by this manner it would provide a suitable through-hole with desired sloped inner sidewalls to meet required contact area for conductive lines formed on the sloped inner sidewalls.

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In re claim 15, Morizumi et al do not expressly teach that the metal layer 13 is at least 1,000 Angstroms thick where the through-hole 10 is the narrowest.

However, the selection of the thickness of the metal layer at the narrowest width of the through-hole is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). For example, selection of the thickness of the metal layer at the narrowest width of the through-hole includes the width of desired active region contact, which is equivalent to the aforementioned front contact, as evidenced by Thomas, in which Thomas teaches selecting a suitable thickness of the metal layer 314a and 314b at the narrowest width of the through-hole in considering the required width of the active region contact 310 (Fig. 3A).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of the invention was made, to optimize the thickness of the metal layer at the narrowest width of the through-hole in Morizumi et al with the considerations of desired active region contact area, as taught by Thomas, since by this manner it would provide a satisfactory contact area for placing integrated circuit die on contacts within a packaging (col. 7, lines 33-39, Thomas).

In re claim 16, Morizumi et al in view of Thomas teach that the metal layer 13 (i.e. Auplated) is selected from gold.

In re claim 17, Morizumi et al in view of Thomas teach that the metal layer 13 (i.e. Auplated pad) on the through-hole 10 is partially plated because the metal layer 13 in Morizumi et al is not fully filled in the through-hole 10.

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5. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morizumi et al in view of Hsuan et al. (US 6,352,923).

Morizumi et al do not teach that the inner walls of the through-hole 10 do not have a constant slope (claim 21) and walls of the through-hole 10 are curved (claim 22).

Hsuan et al., however, in an analogous art, teach a through-hole 52a having a non-constant slop or curved walls, as shown in Figs. 2E-2G, for the purpose of reducing volume and height of packaging (col. 1, lines 59-62, Hsuan et al.).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to substitute a constant-slope-wall through-hole of Morizumi et al with the curved-sidewall through-hole of Hsuan et al, since by this manner it would reduce volume and height of packaging (col. 1, lines 59-62, Hsuan et al.).

Response to Arguments

6. Applicant's arguments filed 3/2/04 have been fully considered but they are not persuasive.

Applicant's arguments is on the ground that cited references teach a printed circuit board (PCB), which cannot be considered as a semiconductor device as asserted.

To the contrary, PCB is a well-known semiconductor device in the art. In addition, none of the claims <u>clearly define</u> what components are included in the semiconductor device. The <u>only</u> place that appears the term "semiconductor device" is in the <u>permeable</u>. Accordingly, one of the ordinary skill in the art <u>cannot</u> patentably distinct the claimed invention with a non-well-defined term "semiconductor device" from the cited references.

Thus, the rejection, as set forth in the previous Office Action, is deemed proper.

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Conclusion

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on M-F ($9:00 \sim 5:00$).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Hsien-Ming Lee Primary Examiner Art Unit 2823 Page 7

May 20, 2004

Krien Min Lee